

Preliminary Estimates of Protected Species Bycatch Rates in the U.S. Atlantic Pelagic Longline Fishery from 1 January to 31 March, 2011

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Background

The U.S. Atlantic Pelagic Longline fleet operates throughout the Northwestern Atlantic Ocean including along the U.S. coast from the Gulf of Mexico to New England, the waters of the Caribbean, and in international waters of the North Atlantic Ocean. The longline fishery has a documented history of incidental takes of non-target species including sea turtles and marine mammals. In June 2004, regulations were implemented to reduce interactions with sea turtles by requiring the use of “circle” hooks. The Biological Opinion also required quarterly reporting of interactions with protected species including sea turtles and marine mammals. The goal of this measure is to more closely monitor any short-term changes in interaction rates to allow more responsive management. This report meets this requirement and includes the observed fishery effort and incidental takes reported by the Pelagic Observer Program (POP) from 1 January to 31 March, 2011.

While it is desirable to estimate the absolute level of takes (i.e. the total number of turtles or mammals estimated to be taken by the fishery), fishery effort data are reported on logbook forms by fishing captains, and current data are therefore not available until several months after the end of any given quarter. Therefore, the bycatch rate (i.e. catch per unit effort) is presented in this report based solely on observer data as an indicator of the relative level of interactions with protected species. The observed bycatch rate by fishing area during quarter 1 of 2011 are compared to that observed in during the prior five years (2006-2010) to determine if the current rates are unusually high or low. Bycatch rates were calculated by fishing area (Figure 1) using the delta log-normal method using hooks as the unit of effort. The analytical methods are described in detail in Garrison (2003).

Results and Discussion

A total of 103 sets (75,158 hooks) were observed during the first quarter with only circle hooks (16/0 and 18/0) recorded. The majority of observed sets occurred in the FEC and SAB fishing areas (Figure 1). The observed effort in the GOM, SAR, and TUN areas cannot be reported because it included three or fewer vessels.

The locations of observed sets and turtle interactions are shown in Figure 1. There was 1 observed interaction with a leatherback turtle, 6 observed interactions with loggerhead turtles, and 1 observed interaction with an olive ridley turtle during quarter 1 (Table 2). All turtles were released alive (Appendix A).

Concerted efforts by fishers to remove hooks and disentangle captured turtles are mandated by the Biological Opinion. Specific information on injuries to sea turtles and gear characteristics of each interaction are shown in Appendix A. The release status for all turtles is summarized in Table 3. The information provided in Appendix A may be used to categorize turtles for post-release mortality estimates as described in SEFSC 2011. During the first quarter, the 1 leatherback turtle was released with a hook and trailing line less than one-half of the carapace length, and 5 of the 6 loggerhead turtles were released in these categories. The olive ridley turtle was released with all gear removed (Table 3).

The quarterly and regional bycatch rates are summarized for sea turtles in Table 4. These rates were compared with the average for 2006-2010 (Table 5).

For leatherback turtles, the bycatch rate during quarter 1 of 2011 was lower than that for 2006-2010 in all areas. The bycatch rate for the SAB was not statistically different from the 5-year average. The CAR area was not observed in 2011 but did have bycatch of leatherbacks in prior years (Table 5). Loggerhead turtle bycatch rates for quarter 1 of 2011 were higher than those from 2006-2010 in the FEC and SAR areas. The rate for the SAR was significantly higher. The CAR area also had bycatch of loggerhead turtles in prior years, but bycatch was not observed during 2011.

No marine mammals were observed during the first quarter. There had been relatively high bycatch of pilot whales in the MAB during quarter 1 in prior years, but there was no observed bycatch in quarter 1 of 2011 (Table 6).

There are a number of caveats and uncertainties associated with the current analysis. First, while these data have undergone an initial audit and review, they are subject to change upon further review after the end of the 2011 calendar year. Second, the delta log-normal estimator was applied to calculate bycatch rates consistent with previous estimates (e.g., Garrison 2003). This approach assumed 1) that catch rates (animals per hook) were log-normally distributed, and 2) that the number of hooks was an appropriate unit of effort. The first assumption has been evaluated for turtles; however, violations of this assumption may have resulted in biased (positive or negative) estimates of catch rate and associated variances. The second assumption has not been examined critically in previous analyses. If this assumption was not correct, for example if there were saturation effects resulting in a non-linear relationship between the number of hooks and total catch, then there potentially may have been a bias in the estimate of bycatch rates.

The interaction between longline gear and protected species is a relatively rare event and is therefore inherently variable. Historically, there have been very large inter-annual fluctuations in bycatch rates and estimates of total bycatch. Thus, any differences observed between short term observations of bycatch rates and long term averages may be simply stochastic events and

are not necessarily indicative of a significant change in the interactions between the longline fishery and protected species.

Literature Cited

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SEFSC. 2011. Protocols for Categorizing Sea Turtles for Post-release Mortality Estimates. PRD Document Number #PRD-2011-07, Available from: Southeast Fisheries Science Center, 75 Virginia Beach Dr., Miami, FL 33149.,
http://www.sefsc.noaa.gov/turtledocs/UPR_SEFSC_NMFS_2011_P-HMortality_est.pdf.

Table 1. Number of sets and hooks observed in the U.S. Atlantic Pelagic Longline Fishery between 1 January and 31 March, 2011 by fishing area. NR indicates areas where effort cannot be reported due to confidentiality considerations.

Area	Sets	Hooks
CAR	0	0
FEC	30	21,112
GOM	NR	NR
MAB	7	4,541
NCA	0	0
NEC	0	0
NED	0	0
SAB	34	25,846
SAR	NR	NR
TUN	NR	NR
Total	103	75,158

Table 2. Total observed interactions with marine turtles in the U.S. Atlantic Pelagic Longline Fishery for sets beginning between 1 January and 31 March, 2011 by fishing area. Areas with missing values indicate no observer coverage during this time period.

Area	Leatherback	Loggerhead	Olive Ridley
CAR	-	-	-
FEC	0	1	0
GOM	0	0	0
MAB	0	0	0
NCA	-	-	-
NEC	-	-	-
NED	-	-	-
SAB	1	0	0
SAR	0	5	0
TUN	-	-	1
Total	1	6	1

Table 3. Release status and gear removal for sea turtles captured in the U.S. Atlantic Pelagic Longline Fishery between 1 January and 31 March, 2011. Condition columns refer to post-release mortality categories in Table 1 of SEFSC 2011.

Release Status	Leatherback	Loggerheads	Olive Ridley
Released entangled (Condition Column A)	0	1	0
Released with hook and line $\geq \frac{1}{2}$ carapace length (Condition Column B)	0	0	0
Released with hook and line $\leq \frac{1}{2}$ carapace length (Condition Column C)	1	2	0
Released with all gear removed (Condition Column D)	0	3	1

Table 4. Estimated bycatch rate (Catch per 1,000 hooks) for (A) Leatherback , (B) Loggerhead, and (C) Olive Ridley turtles by geographic area and between 1 January and 31 March, 2011 in the U.S. Atlantic Pelagic Longline Fishery. Missing values indicate areas with no observer coverage. CV indicates the coefficient of variation of the estimated rate. NR indicates areas where effort cannot be reported due to confidentiality considerations.

A. Leatherback Turtles

Area	Interaction Type	# Observed Sets	# Positive Sets	Mean CPUE	CV CPUE	95% Confidence Interval
CAR	Alive	0	-	-	-	-
FEC	Alive	30	0	0	-	-
GOM	Alive	NR	0	0	-	-
MAB	Alive	7	0	0	-	-
NCA	Alive	0	-	-	-	-
NEC	Alive	0	-	-	-	-
NED	Alive	0	-	-	-	-
SAB	Alive	34	1	0.0329	1.0000	0.0064-0.1678
SAR	Alive	NR	0	0	-	-
TUN	Alive	NR	0	0	-	-

B. Loggerhead Turtles

Area	Interaction Type	# Observed Sets	# Positive Sets	Mean CPUE	CV CPUE	95% Confidence Interval
CAR	Alive	0	-	-	-	-
FEC	Alive	30	1	0.0718	1.0000	0.0141-0.3673
GOM	Alive	NR	0	0	-	-
MAB	Alive	7	0	0	-	-
NCA	Alive	0	-	-	-	-
NEC	Alive	0	-	-	-	-
NED	Alive	0	-	-	-	-
SAB	Alive	34	0	0	-	-
SAR	Alive	NR	5	0.3812	0.4058	0.1773-0.8193
TUN	Alive	NR	0	-	-	-

C. Olive Ridley

Area	Interaction Type	# Observed Sets	# Positive Sets	Mean CPUE	CV CPUE	95% Confidence Interval
TUN	Alive	NR	1	0.1082	1.0000	0.0212-0.5534

Table 5. Bycatch rates for (A) Leatherback turtles and (B) Loggerhead turtles in the U.S. Atlantic Pelagic Longline fishery between 1 January and 31 March, 2011 compared to the first quarter average rate from 2006-2010. 95% CI indicates the estimated 95% confidence interval of the mean bycatch rate (CPUE) in each cell assuming a lognormal distribution of rates. These rates reflect combined alive, dead and unknown turtles.

A. Leatherback turtles

Area	2006-2010 CPUE	2006-2010 95% CI	2011 CPUE	2011 95% CI
CAR	0.1222	0.0240-0.6247	-	-
FEC	0.0700	0.0339-0.1441	0	-
GOM	0.0244	0.0128-0.0467	0	-
MAB	0	-	0	-
NCA	-	-	-	-
NEC	-	-	-	-
NED	-	-	-	-
SAB	0.0618	0.0236-0.1618	0.0329	0.0064-0.1678
SAR	0.0173	0.0034-0.0885	0	-
TUN	0.0476	0.0093-0.2435	0	-

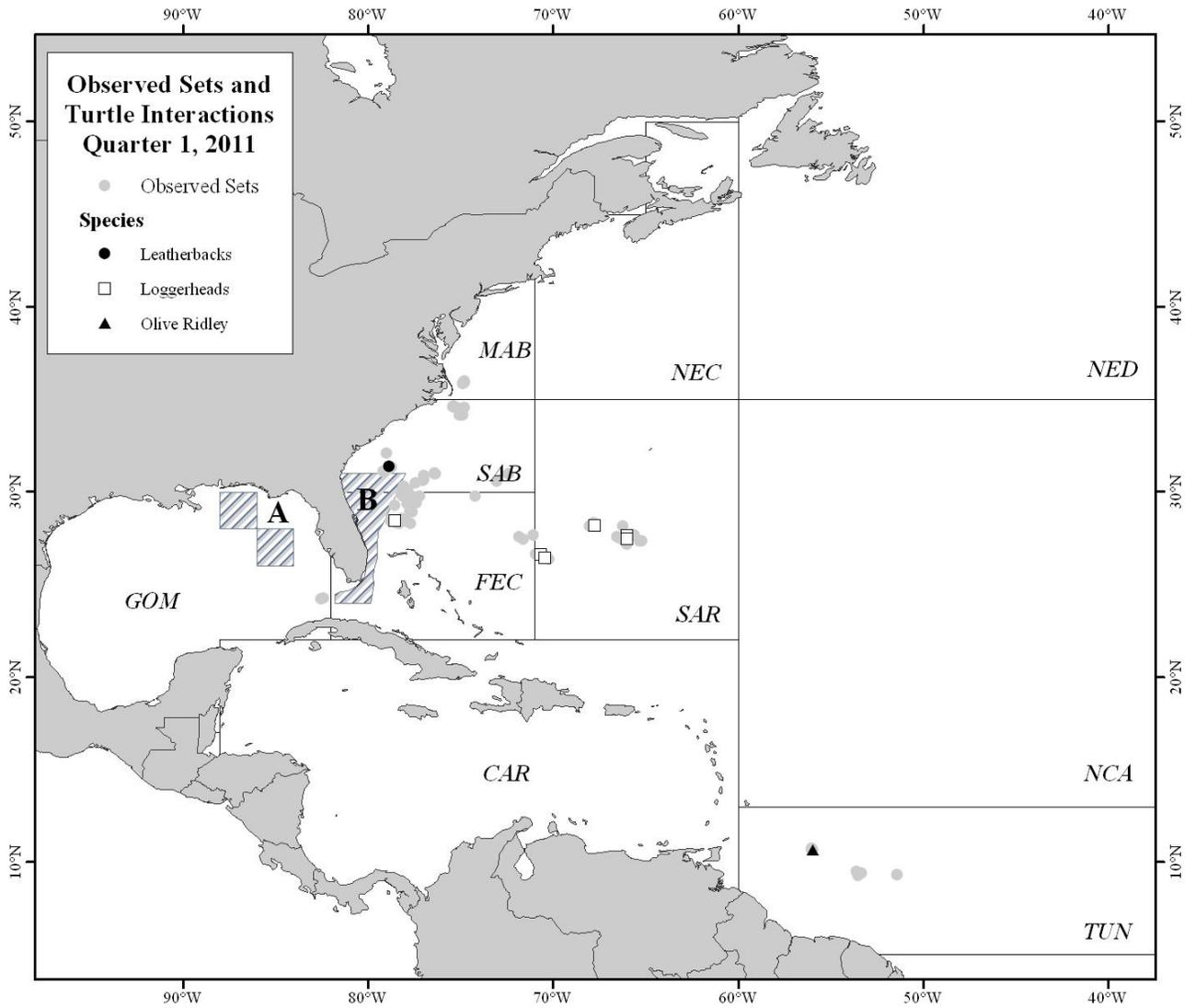
B. Loggerhead Turtles

Area	2006-2010 CPUE	2006-2010 95% CI	2011 CPUE	2011 95% CI
CAR	0.2213	0.0610-0.8035	-	-
FEC	0.0559	0.0269-0.1164	0.0718	0.0141-0.3673
GOM	0	-	0	-
MAB	0	-	0	-
NCA	-	-	-	-
NEC	-	-	-	-
NED	-	-	-	-
SAB	0.0452	0.0182-0.1126	0	-
SAR	0.0826	0.0369-0.1868	0.3812	0.1773-0.8193
TUN	0	-	0	-

Table 6. Bycatch rates for marine mammals in the U.S. Atlantic Pelagic Longline Fishery between 1 January and 31 March, 2011 compared to the first quarter average rate from from 2006-2010. 95% CI indicates the estimated 95% confidence interval of the mean bycatch rate (CPUE) in each cell assuming a lognormal distribution of rates. CPUEs reflect total marine mammals caught including alive, dead, and seriously injured animals.

Species	Area	2006-2010 CPUE	2006-2010 95% CI	2011 CPUE	2011 95% CI
Pantropical Spotted Dolphin	GOM	0.0026	0.0005-0.0126	0	-
Risso's Dolphin	GOM	0.0025	0.0005-0.0210	0	-
Unid. Marine Mammal	GOM	0.0028	0.0006-0.0136	0	-
Pilot Whale	FEC	0.0134	0.00278-0.0665	0	-
Pilot Whale	MAB	0.3314	0.1498-0.7333	0	-
Minke Whale	SAB	0.0004	0.0043-0.1031	0	-

Figure 1. Observed Pelagic Longline effort and turtle interactions between 1 January and 31 March, 2011. Pelagic longline fishing areas include: CAR = Caribbean, GOM = Gulf of Mexico, FEC = Florida East Coast, SAB = South Atlantic Bight, SAR = Sargasso Sea, MAB = Mid-Atlantic Bight, NEC = Northeast Coastal, NED = Northeast Distant, NCA = North Central Atlantic, TUN = Tuna North. Year-round closed areas in the DeSoto Canyon (A) and the Florida East Coast (B) are indicated.



Appendix A: Injury details and hook type for turtles captured in the U.S. Atlantic Pelagic Longline Fishery for sets between 1 January and 31 March, 2011. “Injury Cat. Row” and “Release Cond. Col” refer to rows and columns, respectively, for post-release mortality assignments in SEFSC 2011.

A1. Leatherback Turtles

#	Area	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed ?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	Straight N-N (cm)
1	SAB	C-18/0	10	Mackerel	234	Alive, injured	Released alive	Mouth, side, other	No	No	No	0.50	II	C	4.00		

A2. Loggerhead Turtles

#	Area	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed ?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	Straight N-N (cm)
1	SAR	C-18/0	10	Squid or mackerel	230 or 423	Alive, injured	Released alive	Swallowed, hook partially visible	No	No	No	0.10	III	C		70.3	63.3
2	SAR	C-18/0	10	Squid or mackerel	230 or 423	Alive, injured	Released alive	Swallowed, hook partially visible	No	No	No	0.10	III	C		65.8	57.8
3	SAR	C-18/0	10	Squid or mackerel	230 or 423	Alive, injured	Released alive	Mouth, lower, other	Yes	No	No	0.00	II	D		73.9	68.7
4	SAR	C-18/0	10	Squid or mackerel	176 or 225	Alive, injured	Released alive	Beak internal, lower jaw	Yes	No	No	0.00	I	D		69.2	63.8
5	SAR	C-18/0	10	Squid or mackerel	176 or 234	Alive, injured	Released alive	Mouth, lower, other	Yes	No	No	0.00	II	D		73.2	66.8
6	FEC	C-16/0	0	Squid	320	Alive, injured	Released alive	Front flipper	No	No	Unknown	6.00	I	A	3.50		

A3. Olive Ridley Turtle

#	Area	Hook Type	Offset (degrees)	Bait	Bait Size (g)	Capture Condition	Final Disposition	Hook Location	Hook Removed ?	Entangled Capture?	Entangled Release?	Line Left (ft)	Injury Cat. Row	Release Cond. Col.	CL Est. (ft)	CCL (cm)	Straight N-N (cm)
1	TUN	C-16/0	0	Squid or mackerel	180 or 113	Alive, injured	Released alive	Tongue	Yes	No	No	0.00	III	D		61.4	56.7